



SEQUENCE LISTING

<110> Nuttall, Patricia
Paesen, Guido Christiaan

<120> Histamine and Serotonin Binding
Molecules

<130> 2369-1-002

<140> US 09/555,296

<141> 2002-09-13

<150> PCT/GB98/03530

<151> 1998-11-26

<150> GB 9725046.8

<151> 1997-11-26

<150> GB 9813917.3

<151> 1998-06-26

<160> 31

<170> FastSEQ for Windows Version 4.0

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<212> PRT

<213> Rhipicephalus appendiculatus

<400> 1

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1 5 10 15
Lys Ala Asp Lys Pro Val Trp Ala Asp Glu Ala Ala Asn Gly Glu His
20 25 30
Gln Asp Ala Trp Lys His Leu Gln Lys Leu Val Glu Glu Asn Tyr Asp
35 40 45
Leu Ile Lys Ala Thr Tyr Lys Asn Asp Pro Val Trp Gly Asn Asp Phe
50 55 60
Thr Cys Val Gly Thr Ala Ala Gln Asn Leu Asn Glu Asp Glu Lys Asn
65 70 75 80
Val Glu Ala Trp Phe Met Phe Met Asn Asn Ala Asp Thr Val Tyr Gln
85 90 95
His Thr Phe Glu Lys Ala Thr Pro Asp Lys Met Tyr Gly Tyr Asn Lys
100 105 110
Glu Asn Ala Leu Thr Tyr Gln Thr Glu Asp Gly Gln Val Leu Thr Asp
115 120 125
Val Leu Ala Phe Ser Asp Asp Asn Cys Tyr Val Ile Tyr Ala Leu Gly
130 135 140
Pro Asp Gly Ser Gly Ala Gly Tyr Glu Leu Trp Ala Thr Asp Tyr Thr
145 150 155 160
Asp Val Pro Ala Ser Cys Leu Glu Lys Phe Asn Glu Tyr Ala Ala Gly
165 170 175
Leu Pro Val Pro Asp Val Tyr Thr Ser Asp Cys Leu Pro Glu
180 185 190

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B1

<210> 2
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 <212> PRT
 <213> Rhipicephalus appendiculatus

<400> 2
 Met Lys Leu Leu Ile Leu Ser Leu Ala Leu Val Leu Ala Leu Ser Gln
 1 5 10 15
 Val Lys Gly Asn Gln Pro Asp Trp Ala Asp Glu Ala Ala Asn Gly Ala
 20 25 30
 His Gln Asp Ala Trp Lys Ser Leu Lys Ala Asp Val Glu Asn Val Tyr
 35 40 45
 Tyr Met Val Lys Ala Thr Tyr Lys Asn Asp Pro Val Trp Gly Asn Asp
 50 55 60
 Phe Thr Cys Val Gly Val Met Ala Asn Asp Val Asn Glu Asp Glu Lys
 65 70 75 80
 Ser Ile Gln Ala Glu Phe Leu Phe Met Asn Asn Ala Asp Thr Asn Met
 85 90 95
 Gln Phe Ala Thr Glu Lys Val Thr Ala Val Lys Met Tyr Gly Tyr Asn
 100 105 110
 Arg Glu Asn Ala Phe Arg Tyr Glu Thr Glu Asp Gly Gln Val Phe Thr
 115 120 125
 Asp Val Ile Ala Tyr Ser Asp Asp Asn Cys Asp Val Ile Tyr Val Pro
 130 135 140
 Gly Thr Asp Gly Asn Glu Glu Cys Tyr Glu Leu Trp Thr Thr Asp Tyr
 145 150 155 160
 Asp Asn Ile Pro Ala Asn Cys Leu Asn Lys Phe Asn Glu Tyr Ala Val
 165 170 175
 Gly Arg Glu Thr Arg Asp Val Phe Thr Ser Ala Cys Leu Glu
 180 185 190

<210> 3
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 <212> PRT
 <213> Rhipicephalus appendiculatus

<400> 3
 Met Lys Val Leu Leu Leu Val Leu Gly Ala Ala Leu Cys Gln Asn Ala
 1 5 10 15
 Asp Ala Asn Pro Thr Trp Ala Asn Glu Ala Lys Leu Gly Ser Tyr Gln
 20 25 30
 Asp Ala Trp Lys Ser Leu Gln Gln Asp Gln Asn Lys Arg Tyr Tyr Leu
 35 40 45
 Ala Gln Ala Thr Gln Thr Thr Asp Gly Val Trp Gly Glu Glu Phe Thr
 50 55 60
 Cys Val Ser Val Thr Ala Glu Lys Ile Gly Lys Lys Lys Leu Asn Ala
 65 70 75 80
 Thr Ile Leu Tyr Lys Asn Lys His Leu Thr Asp Leu Lys Glu Ser His
 85 90 95
 Glu Thr Ile Thr Val Trp Lys Ala Tyr Asp Tyr Thr Thr Glu Asn Gly
 100 105 110
 Ile Lys Tyr Glu Thr Gln Gly Thr Arg Thr Gln Thr Phe Glu Asp Val
 115 120 125
 Phe Val Phe Ser Asp Tyr Lys Asn Cys Asp Val Ile Phe Val Pro Lys
 130 135 140
 Glu Arg Gly Ser Asp Glu Gly Asp Tyr Glu Leu Trp Val Ser Glu Asp

145 150 155 160
 Lys Ile Asp Lys Ile Pro Asp Cys Cys Lys Phe Thr Met Ala Tyr Phe
 165 170 175
 Ala Gln Gln Gln Glu Lys Thr Val Arg Asn Val Tyr Thr Asp Ser Ser
 180 185 190
 Cys Lys Pro Ala Pro Ala Gln Asn
 195 200

<210> 4
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 <212> PRT
 <213> Rhipicephalus appendiculatus

<400> 4
 Met Lys Met Gln Val Val Leu Leu Leu Thr Phe Val Ser Ala Ala Leu
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 Ala Thr Gln Ala Glu Thr Thr Ser Ala Lys Ala Gly Glu Asn Pro Leu
 20 25 30
 Trp Ala His Glu Glu Leu Leu Gly Lys Tyr Gln Asp Ala Trp Lys Ser
 35 40 45
 Ile Asp Gln Gly Val Ser Val Thr Tyr Val Leu Ala Lys Thr Thr Tyr
 50 55 60
 Glu Asn Asp Thr Gly Ser Trp Gly Ser Gln Phe Lys Cys Leu Gln Val
 65 70 75 80
 Gln Glu Ile Glu Arg Lys Glu Glu Asp Tyr Thr Val Thr Ser Val Phe
 85 90 95
 Thr Phe Arg Asn Ala Ser Ser Pro Ile Lys Tyr Tyr Asn Val Thr Glu
 100 105 110
 Thr Val Lys Ala Val Phe Gln Tyr Gly Tyr Lys Asn Ile Arg Asn Ala
 115 120 125
 Ile Glu Tyr Gln Val Gly Gly Gly Leu Asn Ile Thr Asp Thr Leu Ile
 130 135 140
 Phe Thr Asp Gly Glu Leu Cys Asp Val Phe Tyr Val Pro Asn Ala Asp
 145 150 155 160
 Gln Gly Cys Glu Leu Trp Val Lys Lys Ser His Tyr Lys His Val Pro
 165 170 175
 Asp Tyr Cys Thr Phe Val Phe Asn Val Phe Cys Ala Lys Asp Arg Lys
 180 185 190
 Thr Tyr Asp Ile Phe Asn Glu Glu Cys Val Tyr Asn Gly Glu Pro Trp
 195 200 205
 Leu

<210> 5
 <211> 207
 <212> PRT
 <213> Rhipicephalus appendiculatus

<400> 5
 Met Phe Leu Ala Gly Phe Phe Ile Phe Gly Ala Ala Val Leu Ser Val
 1 5 10 15
 Leu Ala Glu Glu Thr Pro Asn Asp Arg Cys Thr Thr His Thr Pro Asn
 20 25 30
 Gly Trp Gln Phe Leu Lys Lys Gly Lys Arg Tyr Asp Met Lys Gln Arg
 35 40 45
 Thr Phe Gln Thr Pro Asn Ser Asp Asp Thr Lys Cys Leu Ser Ser Thr
 50 55 60

Ile	Asp	Gly	Lys	Asn	Glu	Asn	Asn	His	Thr	Val	Gln	Ala	Thr	Ile	Arg
65					70					75					80
Tyr	Arg	Asn	Gly	Tyr	Glu	Gly	Lys	Trp	Asp	Thr	Ile	Arg	Gln	Glu	Tyr
		85							90					95	
Glu	Phe	Pro	Asn	Tyr	Thr	Ala	Gly	Asp	Tyr	Asn	Ser	Met	Lys	Thr	Thr
			100					105					110		
Asp	Lys	Ser	Pro	Pro	Pro	Pro	Ala	Ser	Tyr	Leu	Phe	Gly	Tyr	Thr	Gly
		115					120					125			
Ser	Ser	Cys	Ala	Val	Val	Tyr	Val	Asn	Ser	Ile	Gly	Pro	Val	Arg	Ser
	130						135				140				
Asn	Ser	Glu	Asn	Pro	Pro	Glu	Arg	Leu	Thr	Ala	Ser	Gln	Glu	Ser	Ala
145					150					155					160
Gln	Arg	Asp	Cys	Val	Leu	Trp	Val	Asp	His	Asp	Glu	Lys	Ala	Thr	Gln
			165					170						175	
Glu	Gln	Cys	Cys	Glu	Asp	Phe	Phe	Lys	Thr	His	Cys	Lys	Glu	Thr	Val
		180						185					190		
His	Val	Ile	Tyr	Asp	Val	Asn	Arg	Cys	Lys	Glu	Asn	Gly	Ser	Glu	
		195					200					205			

B1
 <210> 6
 <211> 198
 <212> PRT
 <213> Boophilus microplus

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Thr	Val	Ala	Phe	Met	Ile	Pro	Thr	Trp	Ala	Asp	Glu	Gly	Arg	Phe	Gly
		20						25					30		
Lys	Tyr	Gln	Asn	Ala	Trp	Lys	Ala	Leu	Asn	Gln	Arg	Ile	Asn	Thr	Thr
	35						40					45			
His	Val	Leu	Val	Arg	Ser	Thr	Tyr	Ile	Asp	Asn	Pro	Tyr	Leu	Trp	Gly
	50					55					60				
Lys	Asn	Phe	Ser	Cys	Val	Arg	Ala	Arg	Thr	Val	Glu	Val	Phe	Pro	Ser
65				70					75					80	
Ser	Lys	Thr	Val	Glu	Leu	Glu	Phe	Ser	Phe	Arg	Asn	Arg	Thr	Gly	Ile
			85					90					95		
Leu	Cys	Met	Arg	Asn	Gln	Thr	Val	Arg	Ala	Gly	Lys	Asp	Tyr	Phe	Tyr
			100					105					110		
His	Gln	Pro	Asn	Ala	Phe	Glu	Phe	Met	Leu	Arg	Gly	Asn	Arg	Ser	Phe
		115					120					125			
Ser	Asn	Ala	Val	Met	Phe	Thr	Asp	Gly	Met	Thr	Cys	Asn	Leu	Leu	Ser
	130						135				140				
Phe	Pro	Tyr	Gln	Arg	Asn	Lys	Pro	Gln	Cys	Glu	Leu	Trp	Val	Lys	Asp
145					150					155					160
Thr	Arg	Val	Asp	Asn	Ile	Pro	Pro	Cys	Cys	Ser	Phe	Met	Phe	Asp	Tyr
			165					170						175	
Leu	Cys	Pro	Gln	Pro	Arg	Pro	Phe	Ile	Ile	Tyr	Asp	Lys	Ala	Met	Cys
			180					185					190		
Thr	Val	Arg	Pro	Pro	Arg										
		195													

<210> 7
 <211> 203
 <212> PRT
 <213> Boophilus microplus

<400> 7

Met Lys Ala Leu Leu Ile Ala Val Gly Tyr Leu Ala Ala Val Thr Ala
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Ala Pro Gln Ala Ser Pro Ser Ser Pro Arg Asn Glu Pro Leu Lys Asn
20 25 30
Thr Thr Trp His Ser Lys Glu Leu Lys Asn Tyr Gln Asp Ala Trp Lys
35 40 45
Ser Ile Asn Gln Asn Val Ser Thr Thr Tyr Tyr Phe Leu Arg Ser Thr
50 55 60
Tyr Asn Asn Asp Ser Val Trp Gly Lys Asn Phe Thr Cys Leu Ser Val
65 70 75 80
Thr Val Thr Ser Lys His Glu Ser Thr Phe Thr Val Glu Tyr Asn Thr
85 90 95
Thr Tyr Lys Asn Gln Ser Gln Gln Trp Val Ser Met Thr Glu Asn Val
100 105 110
Thr Ala Val Gln Glu Glu Gly Tyr Asp Val Lys Asn Ile Ile Gln Trp
115 120 125
Thr Thr Glu Asn Asn Thr Lys Phe Asn Asp Thr Val Val Phe Thr Asp
130 135 140
Gly Gln Thr Cys Asp Leu Leu Tyr Ile Pro Tyr Lys Glu Asn Gly Tyr
145 150 155 160
Glu Leu Trp Val Arg Ser Asp Tyr Leu Gln Asn Thr Pro Thr Cys Cys
165 170 175
Gln Phe Ile Phe Asp Leu Val Ala Leu Gly Arg Thr Thr Tyr Asn Ile
180 185 190
Ser Thr Pro Asp Cys Val Thr Lys Thr Ser Arg
195 200

<210> 8

<211> 203

<212> PRT

<213> Boophilus microplus

<400> 8

Met Lys Ala Leu Leu Ile Ala Val Val Tyr Leu Thr Ala Val Thr Ala
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Ala Asp Gln Ala Pro Pro Ser Ser Thr Arg Asn Glu Pro Leu Glu Lys
20 25 30
Thr Thr Trp His Asn Gln Thr Leu Gly Arg Tyr Gln Asp Ala Trp Lys
35 40 45
Ser Ile Asn Gln Ser Val Gly Thr Thr Tyr Tyr Phe Leu Arg Ser Thr
50 55 60
Tyr Asn Asn Asp Ser Val Trp Gly Lys Asn Phe Thr Cys Leu Ser Val
65 70 75 80
Thr Val Thr Ser Lys Tyr Glu Ser Thr Phe Thr Val Glu Tyr Asn Thr
85 90 95
Thr Tyr Lys Asn Gln Ser Gln Gln Trp Val Ser Met Ser Glu Asn Val
100 105 110
Thr Ala Val Gln Glu Gly Gly Tyr Ser Val Lys Asn Ile Ile Gln Trp
115 120 125
Thr Thr Glu Asn Asn Thr Lys Phe Asn Asp Thr Val Val Phe Thr Asp
130 135 140
Gly Gln Thr Cys Asp Val Leu Tyr Ile Pro Tyr Lys Glu Asp Gly Tyr
145 150 155 160
Glu Leu Trp Val Arg Ser Glu Tyr Leu Gln Asn Thr Pro Thr Cys Cys
165 170 175
Gln Phe Ile Phe Asp Leu Val Ala Leu Gly Arg Thr Thr Tyr Asn Ile

180
 Ser Thr Pro Asn Cys Val Ala Thr Thr Ala Gly 190
 195 200

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<210> 9
<211> 285
<212> PRT
<213> Boophilus microplus
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Gly	Trp	Arg	Thr	Arg	Ile	Gln	Glu	Lys	Gly	Pro	Glu	Asn	Asn	Pro	Leu	
			20					25					30			
Met	Asn	Thr	Gln	Arg	Leu	Gly	Lys	Met	Gln	Asp	Ala	Trp	Lys	Ser	Leu	
			35				40					45				
Glu	Lys	Ala	Thr	Asn	Gln	Ser	Tyr	Val	Leu	Val	Phe	Arg	Ser	Arg	Asn	
	50					55					60					
His	Glu	Pro	Glu	Ile	Ser	Cys	Val	Tyr	Val	Arg	Ala	Ser	Asn	Ile	Asn	
65					70					75					80	
Asn	Asp	Thr	Lys	Thr	Ala	Thr	Tyr	Thr	Arg	Thr	Tyr	Tyr	Asn	Met	Thr	
				85					90					95		
Ala	Asn	Ala	Thr	Met	Thr	Val	Asn	Tyr	Thr	Ala	Arg	Ala	Leu	Lys	Gln	
			100					105					110			
Val	Asp	Tyr	Glu	Ser	Glu	Asn	Val	Val	Arg	Val	Asn	Leu	Thr	Gly	Gly	
		115					120					125				
Val	Pro	Ser	Asn	Asp	Thr	Val	Pro	Leu	Gly	Ser	Tyr	Glu	Tyr	Val	Glu	
	130					135					140					
Tyr	Gly	Asn	Tyr	Ser	Cys	Asn	Ser	Ser	Ser	Thr	Pro	Phe	Leu	Asp	Ala	
145					150					155					160	
Val	Gln	Met	Ala	Ser	Gln	Gly	Gln	Ser	Arg	Gly	Pro	Asp	Ile	Glu	Gly	
				165					170					175		
Arg	Thr	Tyr	Leu	Asp	Phe	Tyr	Val	Val	Tyr	Asn	Gln	Pro	Ser	Cys	Asn	
			180					185					190			
Val	Leu	Lys	Ser	Pro	Leu	Leu	Gly	Gly	Ala	Cys	Asp	Phe	Trp	Val	Thr	
		195					200					205				
Glu	Ser	Glu	Leu	Gln	Lys	Ala	Leu	Asn	Lys	Thr	Ser	Glu	Lys	Lys	Lys	
	210					215					220					
Thr	Lys	Leu	Glu	Ala	Arg	Ala	Arg	Lys	Ala	Gly	Gly	Asp	Ser	Asp	Asp	
225					230					235					240	
Gln	Gly	Pro	Glu	Leu	Glu	Val	Val	Phe	Lys	Asn	Leu	Pro	Pro	Pro	Cys	
				245					250					255		
Arg	Ala	Ala	Phe	Ile	Thr	Ser	Cys	Gly	Tyr	Pro	Thr	Phe	Leu	Met	Tyr	
			260					265					270			
Asn	Lys	Thr	Ile	Cys	Asn	Arg	Thr	Asp	Ser	Ala	Ala	Val				
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<210> 10
<211> 284
<212> PRT
<213> Boophilus microplus
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<400> 10
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Gly Trp Arg Thr Arg Ile Gln Glu Lys Gly Pro Glu Asn Asn Pro Leu
          20          25          30

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Met Asn Thr Gln Arg Leu Gly Lys Met Gln Asp Ala Trp Lys Ser Leu
 35 40 45
 Glu Lys Ala Ala Asn Gln Thr Tyr Val Leu Val Phe Arg Ser Arg Asn
 50 55 60
 His Glu Pro Asp Ile Ser Cys Val Tyr Val Arg Ala Ser Asn Leu Asp
 65 70 75 80
 Asn Ala Thr Lys Thr Ala Asp Tyr Thr Arg Thr Tyr Tyr Asn Met Thr
 85 90 95
 Ala Lys Gln Asn Val Ser Val Asn Tyr Thr Ala Arg Ala Leu Lys Gln
 100 105 110
 Val Asp Tyr Glu Ser Glu Asn Val Arg Val Asn Leu Thr Gly Gly
 115 120 125
 Val Pro Ser Asn Asp Thr Val Pro Pro Gly Ser Phe Glu Tyr Val Glu
 130 135 140
 Tyr Gly Asn Tyr Ser Cys Asn Ser Ser Ser Thr Pro Phe Leu Asp Ala
 145 150 155 160
 Val Gln Met Ala Ser Gln Gly Gln Ser Trp Gly Pro Asp Val Glu Gly
 165 170 175
 Arg Thr Tyr Leu Asp Phe Tyr Val Val Tyr Asn Gln Pro Ser Cys Asn
 180 185 190
 Val Leu Lys Ser Pro Leu Leu Gly Gly Ala Cys Asp Phe Trp Val Pro
 195 200 205
 Gln Ser Glu Leu Asp Lys Val Leu Asn Lys Lys Gly Asp Lys Lys Lys
 210 215 220
 Pro Ala Lys Ser Ser Ser Gln Asn Gly Asp Glu Gly Ser Asp Ala Glu
 225 230 235 240
 Gln Pro Glu Leu Glu Ala Ile Phe Lys His Leu Pro Pro Pro Cys Arg
 245 250 255
 Ala Ala Phe Ile Thr Ser Cys Gly Tyr Pro Asn Phe Leu Met Tyr Asn
 260 265 270
 Lys Thr Ile Cys Asn Ala Ala Gly His Ala Ala Asn
 275 280

<210> 11
 <211> 321
 <212> PRT
 <213> Boophilus microplus

<400> 11
 Met Asp Ile Arg Ser Ala Val Leu Phe Ala Cys Ile Val Ser Ala Cys
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 Cys Gly Phe Trp Arg Trp Thr Thr Arg Arg Val Thr Lys Lys Pro Asp
 20 25 30
 Asn Ser Pro Leu Leu Asn Asn Gln His Leu Gly Leu Phe Gln Asp Ala
 35 40 45
 Trp Lys Thr Ile Glu Glu Thr Ser Asn Asp Thr Tyr Val Leu Met Phe
 50 55 60
 Arg Ser Lys His Tyr Asp His Glu Asn Lys Ala Lys Cys Val Phe Val
 65 70 75 80
 Thr Ala Asn Ile Thr Asp Ser Arg Asn Lys Thr Ala Asn Tyr Thr Ile
 85 90 95
 Thr Tyr Tyr Asp Thr Thr Thr Asn Thr Ser Asn Asn Phe Thr Ile Pro
 100 105 110
 Val Arg Ala Leu Asn Gln Thr Asp Tyr Ser Leu Glu Asn Val Ile Arg
 115 120 125
 Ala Ser Phe Asn Gly Asp Thr Pro Ser Ser Thr Pro Ala Pro Pro Gly
 130 135 140

Ser Ser Val Tyr Ile Gln Tyr Asn Asn Val Thr Cys Tyr Ala Gln Tyr
 145 . 150 155 160
 His Pro Phe Ser Asn Asn Gly Ile Ser Ala Lys Tyr Asp Glu Met Pro
 165 170 175
 Arg Asp Gly Arg Asn Tyr Leu Phe Asp Asn Phe Ile Gly Ala Tyr Leu
 180 185 190
 Asp Phe Tyr Val Val Phe Ser Gln Pro Thr Cys Asn Val Leu Arg Val
 195 200 205
 Arg Glu Gly Cys Asp Phe Trp Leu Arg Lys Thr Glu Leu Pro Ser Leu
 210 215 220
 Leu Lys Ala Ala Glu Asn Asp Asp Asn Asp Asn Thr Glu Ser Leu Lys
 225 230 235 240
 Asn Tyr Trp Glu Arg Ile Asn Asn Thr Lys Thr Arg Phe Arg His
 245 250 255
 Asn Thr Lys Lys Cys Lys Met Tyr Val Gln Arg Tyr Ser Ile Glu Lys
 260 265 270
 Ala Glu Asp Val Phe Lys Asn Thr Ala Phe Lys His Leu Pro Ser Asp
 275 280 285
 Cys Arg Phe Ala Phe Leu Ala Ala Cys Gly Asn Pro Ala Phe Thr Ile
 290 295 300
 Tyr Asp Pro Glu Thr Cys Asn Ser Ser Leu Pro Ala Asn Met Ala Glu
 305 310 315 320
 Ser

<210> 12
 <211> 770
 <212> DNA
 <213> Rhipicephalus appendiculatus

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 aagccgataa gccagtttgg gcggatgaag cggcaaacgg ggaacaccaa gacgcctgga 120
 agcatctcca aaaactcggt gaagagaatt acgacttgat aaaagccacc tacaagaacg 180
 acccagtttg gggtaacgac ttcacttgcg tgggtactgc agcgcagaat ttgaacgagg 240
 acgagaagaa cggtgaagca tggtttatgt ttatgaataa tgctgatacc gtataccaac 300
 atacttttga aaaggcgact cctgataaaa tgtacgggta caataaggaa aacgccatca 360
 catatcaaac agaggatggg caacttctca cagacgtcct tgcattctct gacgacaatt 420
 gctatgtcat ctacgctctt ggcccagatg gaagtggagc aggttacgaa ctctgggcta 480
 ccgattacac ggatgttcca gccagttgtc tagagaagtt caatgagtat gctgcaggtc 540
 tgccggtagc ggacgtatac acaagtgatt gcctcccaga ataacttggg catatcgtaa 600
 tttcaacttc aaagtgtgtt attgtcagca tatgtctcga gtgtttgatg tagtgcggtc 660
 gatgatgcca ttcacttagg tttcgggtgt tcggtacttt atgctcactg ccgacggcca 720
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<210> 13
 <211> 793
 <212> DNA
 <213> Rhipicephalus appendiculatus

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 gtgcacacca agacgcctgg aagagtctga aagcggacgt tgaaaacggt tactacatgg 180
 tgaaggccac ctataagaat gacccagtgt ggggcaatga cttcacttgc gtgggtgtta 240
 tggcaaata tgtcaacgag gatgagaaga gcattcaagc agagtttttg tttatgaata 300
 atgctgacac aaacatgcaa ttcgccactg aaaaggtgac tgctgttaaa atgtatggtt 360

acaatagggga	aaacgccttc	agatacgaga	cggaggatgg	ccaagttttc	acagacgtca	420
ttgcatactc	tgatgacaac	tgcgatgtca	tctacgttcc	tggcacagac	ggaaatgagg	480
aaggttacga	actatggact	acggattacg	acaacattcc	agccaattct	ttaaataagt	540
ttaatgagta	cgctgtagg	agggagacaa	gggatgtatt	cacaactgct	tgccatagagt	600
aataacttca	gaatgtcggt	ctttcaaagc	gaaaaaccaa	caatgtgaac	atcggttgc	660
tgtgctcgac	gtagccagcg	ataatgttgt	tttcctgggt	ttctgggttt	ggatactttt	720
agccactgcc	gaagagctgt	aaaggtaatg	aaaaataaaa	tgttcaagag	tgtgaaaaaa	780
aaaaaaaaaa	aaa					793

<210> 14

<211> 753

<212> DNA

<213> Rhipicephalus appendiculatus

<400> 14

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agccttcagc	aagacaaaa	caagagatac	tatttggcac	aagcgacaca	aacgactgac	180
ggcgtatggg	gtgaagagtt	tacttgtgtg	agtgttacgg	ctgagaagat	tggaaagaaa	240
aaacttaacg	ctacgatcct	ctataaaaa	aagcacctta	ctgacctgaa	agagagtcac	300
gaaacaatca	ctgtctggaa	agcatacgac	tacacaacgg	agaatggcat	caagtacgag	360
acgcaaggga	caaggacgca	gactttcgaa	gatgtctttg	tattctctga	ttacaagaac	420
tgcgatgtaa	ttttcgttcc	caaagagaga	ggaagcgacg	agggcgacta	tgaattgtgg	480
gttagtgaag	acaagattga	caagattccc	gattgctgca	agtttacgat	ggcgtacttt	540
gccaacagc	aggagaagac	ggttcgtaac	gtatacactg	actcatcatg	caaaccagca	600
ccagctcaga	actgatattc	tggtaatgct	tgaaccgtaa	tggttcgacc	tgcagtctag	660
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ataaaatagt	tccctgcatt	gacaaaaaaa	aaa			753

<210> 15

<211> 719

<212> DNA

<213> Rhipicephalus appendiculatus

<400> 15

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aaatatcaag	atgcctggaa	aagcatcgat	cagggcggtg	cggtgactta	tgtccttgca	180
aagacaacat	atgagaatga	cacaggatca	tggggatccc	agtttaagt	cctccaggta	240
caagaaatag	aaagaaagga	agaagactat	acagttacat	ctgttttcac	ctttagaaat	300
gcgtcttctc	caatcaagta	ttacaacgtg	acagaaacag	tgaaggccgt	ttttcaatat	360
ggatacaaaa	acataaggaa	tgcaattgaa	taccaagtgg	gcggtggact	taacataacc	420
gacacgtcca	ttttcactga	tggagaatta	tgcgatgttt	tctatgttcc	caatgcagat	480
caaggtttgg	agctctgggt	caaaaagagt	cactacaaac	acgtaccaga	ctactgcacg	540
ttcgtgttca	atgttttctg	tgcgaaagac	aggaaaacct	acgatataat	taatgaagaa	600
tgtgtttata	acggcgaaac	ctggctttta	aggcaaaaa	tctataaaat	acggtttctg	660
tagtaagtac	taatagcaag	tagttgaata	ataaaaagat	tgtaagtgca	aaaaaaaa	719

<210> 16

<211> 832

<212> DNA

<213> Rhipicephalus appendiculatus

<400> 16

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gttttggctg	aggagacacc	taatgataga	tgtactacac	acactcctaa	tggatggcag	120
tttctcaaga	aaggcaagag	atacgatatg	aaacagagaa	ccttccaaac	acctaactca	180

gacgacacta	aatgcctgtc	cagtactatc	gacggaaaga	atgaaaataa	ccatacagta	240
caagcaacga	taagatatcg	aaatgggttat	gaaggaaaat	gggacacccat	ccgccaggag	300
tacgagttcc	ccaactacac	tgcaggagac	tacaactcca	tgaagacaac	agacaaatcc	360
ccgcctccgc	cggcatcata	cctgtttgga	tatactggaa	gctcttgtgc	cgtggtgtac	420
gtgaattcca	ttggacctgt	tcgtagcaat	tctgaaaacc	caccagaaag	actcacagca	480
agtcaggaaa	gtgcacaacg	cgattgcgtc	ctttgggtcg	atcacgatga	aaaagctacc	540
caagaacaat	gctgtgaaga	tttcttcaag	acccactgca	aagagactgt	ccatgtcata	600
tacgacgtga	atagatgcaa	ggagaatggc	agtgaataac	acgatgccgg	gaatggcatg	660
gcgacttcat	ttatgaagga	agacttccac	agatgtgaaa	cttgcccttca	ttttgcttgt	720
tacttttagac	caacatatc	ttccttttcc	gacttcaatg	atatgatcta	ggttgtaaaa	780
agagcgtttt	aataaagaaa	gtattagcat	cgatgatgga	aatataaaaa	aa	832

<210> 17

<211> 1488

<212> DNA

<213> Ambyomma variegatum

<400> 17

gcgaccgcgc	ccagccgtac	agaacaaata	gccttcggtg	caaacgtgca	gcgtagtcgg	60
atgcctagtt	aaacaccaca	cacacgtaaa	aagtagacga	aactggcttc	gcttccagca	120
ccaagcagggt	catcgtctgg	tccactgacg	atgaactctg	ccttgtgggt	tttactagga	180
tcatccttat	ggctgcatac	ggtagcgttc	atgattccca	catgggcaga	tgaaggcagg	240
tttggcaagt	accagaacgc	ctggaaggcc	ctgaatcagc	ggattaacac	aacacatgtc	300
cttgtgaggt	caacgtatat	cgacaatcca	tatttatggg	gcaagaactt	ctcatgcgta	360
cgcgctcgaa	ctgtcgaagt	ctttcccagc	agcaagactg	tggaactgga	gtttagtttc	420
agaaacagga	ctggtatat	gtgcatgaga	aatcaaaccg	ttcgagctgg	aaaggattac	480
ttttatcatc	agcctaacgc	cttcgaattc	atgctgagag	gtaacaggtc	gttttctaac	540
gctgtcatgt	ttaccgacgg	aatgacatgt	aatctgctca	gctttccata	ccagcgcac	600
aaaccacaat	gcgaactatg	ggatgaaggac	acgcgcgtcg	acaacattcc	cccttgttgc	660
tcgttcatgt	tcgactat	gtgcccacag	cctcgtccat	tcattcattta	cgacaaagca	720
atgtgcacgg	tgaggccacc	ccgctagaaa	gaaaagggat	gaaaaggcta	ctcgaagaag	780
caacaaccaa	tcagtgccca	caagagaacc	gttccagtcc	tgcgaaagt	gcgcctccca	840
aaacacatac	atttccactgc	aaagatgacc	gatgcagtcg	caaattcgtg	tcctagaact	900
caagtgtgt	tttggaaact	cggaaaggag	acagtagaag	ctaactgctg	tgatacctag	960
gccaggcatt	tccgtcgggc	actgtttttt	atgaataggg	taggggtgaa	gtattttggc	1020
tttgtgtgg	cccaataaat	agcgtatat	agcggactag	catcgaagtt	ccagatgcta	1080
taaagcagct	aaaactcact	tctgcctgga	acttcgatag	gtattgaata	gatcatgcgc	1140
gcacagaaaa	gaaaagtatc	aatcaaaaaca	taaaaagcat	tcttcgcatg	tgcgcaaagc	1200
attccctaag	tcacgctaa	aaatagggtg	catttcatat	agcatcgagt	tctatacgtt	1260
cttaagatgc	taccgggtcat	tcattccctt	ctcgtctatg	cctcatggat	ctgaaccaag	1320
ttcttctatt	gcctccttgt	tttccggtag	ctacagagtt	cagcagcacc	attgctagt	1380
catattttat	cttcgtgctg	tgtttgtcgc	agtatat	tctgcctatt	cacgatattt	1440
gcacaatgta	ataaaacatt	tgcttgcccta	aaaaaaaaaa	aaaaaaaaaa		1488

<210> 18

<211> 760

<212> DNA

<213> Boophilus microplus

<400> 18

ctccagctct	gcttcgacga	tgaaggctct	cctgatcgct	gtcggctacc	tggtgcccgt	60
cacagcggca	ccccaaagctt	cgccttcctc	tccgaggaaac	gaaccactca	agaatactac	120
gtggcacagc	aaggaactga	aaaattatca	agatgcgtgg	aagtccatca	atcaaaacgt	180
cagcactacc	tactacttcc	tcagatcaac	ctacaacaac	gacagtgtct	ggggtaaaaa	240
tttcacctgt	cttagcgtca	cggtgacatc	gaaacatgaa	tcaacgttca	ccgtcgaata	300
taacaccacg	tacaaaaatc	agagccaaca	atgggtcagc	atgacggaaa	acgtcacggc	360
cgtgcaggag	gagggctacg	acgttaaaaa	tatcattcag	tggacaacag	agaataacac	420

aaagttcaat	gatactgttg	tttttacgga	cggccagact	tgtgatctgt	tgtacatccc	480
gtacaaagaa	aacgggttacg	agctgtgggt	gcgttcggat	tacctgcaga	acactccaac	540
gtgctgccag	ttcatctttg	acctcgtcgc	attgggacgt	accacgtaca	atatctccac	600
tcctgactgc	gtgacaaaaa	cctctcgtta	gaccgtgaaa	gccgcggctt	atgctactcg	660
actgctcagg	ttggaagagt	agggagcccc	gacgcgcact	actactaaaa	atgattccaa	720
ataaagtatt	caaacatttc	aaaaaaaaaa	aaaaaaaaaa			760

<210> 19

<211> 765

<212> DNA

<213> Boophilus microplus

<400> 19

agtgactcct	gctctgcttc	gacgatgaag	gctctcctga	tcgctgtcgt	ctacctgact	60
gccgtcacag	cggcagacca	agctccgcct	tcctctacga	ggaatgaacc	actcgagaaa	120
actacctggc	acaaccagac	actgggacgt	tatcaagatg	cgtggaagtc	catcaatcaa	180
agcgtcggca	ctacctacta	cttcctcaga	tcaacctaca	acaacgacag	cgtgtgggggt	240
aaaaatttca	cctgtcttag	cgtcacgggtg	acatcgaaat	atgaatcaac	gttcaccgtc	300
gaatataaca	ccacgtacaa	aaatcagagc	caacaatggg	tcagcatgtc	ggaaaacgtc	360
acggccgtgc	aggagggcgg	ctacagtgtt	aaaaacatca	ttcagtggac	aacggagaat	420
aacacaaagt	tcaatgatac	tgttggtttt	acggacggcc	agacttgtga	tgtgtttatac	480
atcccgtaca	aagaagacgg	ttacgagctg	tgggtgcgtt	cggaatacct	gcagaacact	540
ccaacgtgct	gccagttcat	ctttgacctc	gtcgcattgg	gacgtaccac	gtacaatatc	600
tccactccta	actgcgtggc	caccaccgct	ggttagacaa	tgcaagccgc	ggcttaattt	660
actcgaccgc	tcaggttgga	agtgccggga	gcctcgacgg	gcactactac	ttaaaatgat	720
ttcgaataaa	gtattcaagc	atttctggaa	aaaaaaaaaa	aaaaa		765

<210> 20

<211> 1046

<212> DNA

<213> Boophilus microplus

<220>

<221> misc_feature

<222> (1) ... (1046)

<223> n = A,T,C or G

<400> 20

gatggcgtc	agatttgcac	ttctgctggc	gtgcatcgtc	acggcatgtg	gctggagaac	60
acggattcaa	gagaaaggtc	cggagaacaa	ccctctcatg	aacacccaac	gtttgggaaa	120
aatgcaagac	gcatggaaga	gtctggaaaa	ggcaacaaat	cagtcgtatg	tcttgggtgtt	180
ccgctcaaga	aatcacgaac	cagagatatc	ctgcgtgtac	gtgagggcta	gtaatatataa	240
taatgacact	aaaactgcaa	cttataccag	aacatattac	aatatgacgg	caaacgcaac	300
catgacgggtg	aattatactg	caagagctct	gaagcaagtg	gactatgagt	cggaaaatgt	360
cgtacgagta	aacctgacag	gtgggggtccc	cagcaacgat	acagttcctc	ttggaagcta	420
cgaatacgtc	gagtacggta	attactcctg	caatagctca	tcgacaccct	ttttggatgc	480
tgtgcaaagt	gcatcgcaag	ggcaatccag	agggccggat	atcgaagggc	gcacatatct	540
agactttctac	gtcgtctaca	atcaaccatc	gtgcaatgtc	ctgaagtccc	cgctcctggg	600
aggtgcttgt	gactttttggg	tgacagaatc	cgagttgcaa	aaagcactaa	ataagacatc	660
agagaagaaa	aaaacaaagc	tagaagcgag	agcaaggaaa	gctggaggag	attccgatga	720
ccagggacct	gaactggagg	tcgtcttcaa	aaatctgccc	cctccctgcc	gcgcagcgtt	780
cataacttcc	tgcggtatc	caacttttct	tatgtacaac	aagaccatct	gtaatcgaac	840
ggattctgct	gcggtgtgaa	cgtcccctgc	gagcaagtag	aacgtccgtg	aagacagcag	900
gaagatagtt	gactgttttg	ttggcggaat	gtgactacta	gtctgaatca	ttaaaaagat	960
tcngctgacg	ggtgtggcgg	gaactttttt	aaatgaaatt	ggtcatactt	gttgaaagac	1020
aaaaataaaa	caatatgtta	ctcctc				1046

<210> 21
 <211> 1025
 <212> DNA
 <213> Boophilus microplus

<400> 21
 ggaaaccagg atggcgctca gatttgcact tctgctggcg tgcacgtca cggcatgtgg 60
 ctggagaaca cggattcaag agaaaggtcc cgagaacaac cctctcatga acacccaacg 120
 tttgggaaaa atgcaagacg catggaagag tctggaaaag gcagcaaatac agacgtatgt 180
 cttggtgttc cgctcaagaa atcacgaacc agatataatcc tgcgtctacg tgagagctag 240
 taatttagat aatgcaacta aaactgcaga ttataccaga acatattaca atatgacggc 300
 aaaacaaaac gtgtcggtaa attatactgc aagagctctg aagcaagtgg actatgagtc 360
 ggaaaatgtc gtacgagtaa acctgacagg tggggtcccc agtaacgata cagttctctc 420
 tggaaagcttc gaatacgtcg agtacggtaa ttactcctgc aatagctcat cgacaccctt 480
 tttggatgct gtgcaaatgg catcgcaagg gcaatcctgg gggccggatg tcgaagggcg 540
 cacatatcta gatttctacg tctctacaa tcaaccgtcg tgcaatgtcc tgaagtcccc 600
 gctcctggga ggtgcttggt acttctgggt gccacaatca gagttggaca aggtactaaa 660
 caaaaaagga gataagaaaa agccagctaa gtcaagcagt caaaatggag acgaaggttc 720
 tgatgccgag caacctgaac tggaggccat ctttaaactc ctacccccctc cctgccgcgc 780
 agcgttcata acttctctgc gctatccaaa tttctctcatg tacaacaaga cgatctgtaa 840
 tgcagcgggt catgctgcga actgaacgtc ctctgcgaac gagtagagcg tgcgtaaaaa 900
 caactggtct gaatcttcta agaaattcgg caaagtgcgg gtggcgcgaa cttttatcaa 960
 actggtcata catgtgaaag aaaaaataa aacaaaatgt gcataaaaaa aaaaaaaaaa 1020
 aaaaa 1025

<210> 22
 <211> 1156
 <212> DNA
 <213> Boophilus microplus

<220>
 <221> misc_feature
 <222> (1)...(1156)
 <223> n = A,T,C or G

<400> 22
 cgaagagcag gtacgattcg aatctttgca atggacattc gcagcgctgt tttgttcgcg 60
 tgcacgtctt cggcgtgttg tggtttttgg cgctggacaa cacggagggt aactaaaaag 120
 cctgataaca gccctctgtt gaacaaccaa catcttggtc tttccagga cgcattggaag 180
 actatagaag agacgtccaa tgatacgtat gtccctgatgt tccgctcaaa acattacgac 240
 cagagaaca aggctaaatg tgtcttcgta acggcaataa ttactgactc ccggaacaaa 300
 actgccaatt acacaataac gtattacgat actacaacaa atacatccaa caattttaca 360
 atcccagtga gagctctgaa ccaaactgac tactcactag aaaatgtgat tcgagcaagc 420
 ttcaacggcg aactccaag ctctactcca gccctcccg gaagcagcgt gtacattcag 480
 tataataatg ttacctgcta cgcccaatat caccattttt caaataatgg aatcagtgca 540
 aaatatgatg aaatgccccg ggatggccga aattacttgt tcgacaattt tattggtgct 600
 tacttggtact tctacgtggt gttcagccag ccgacatgca acgttctcag agtccgagaa 660
 ggatgtgact tctggctaag gaaaactgag ttgccaaagg tactgaaagc agcagaaaaat 720
 gatgacaacg ataacacgga atcgctgaag aactattggg aaagaagaat aaataatact 780
 aaaacaagat ttcgacataa tactaagaaa tgtaagatgt acgtacaacg ttattcaatt 840
 gagaaggctg aagatgtctt taaaaaact gcttttaaac acctccccctc cgactgccgc 900
 tttgccttcc tggccgcttg tggaaatcca gcattcacia tatacgacct agaaacatgt 960
 aatagctccc tgccagctaa tatggcagaa agttaaatga gctatttcac ttcattgttcg 1020
 accgtatgcc tggatgcaa gaagggtgagg ttggacagga tacttccgaa ttattttttc 1080
 agtctgcctt gtacgcacga aataacaaaa tatctgttga agccnncaac nnnnnnaana 1140
 anaaaaaana aaaaaa 1156

<210> 23
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> (1)...(26)
<223> n = A,T,C or G

<400> 23
aayggngarc aycargaygc ntggaa

26

B1
<210> 24
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<221> misc_feature
<222> (1)...(26)
<223> n = A,T,C or G

<400> 24
ktrtmrtcng tnryccanar ytcrtta

26

<210> 25
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> tagging sequence

<400> 25
tatatgatca gaaaacccgc tctggg

26

<210> 26
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> tagging sequence

<400> 26
tatactcgag ccagggttcg ccgt

24

<210> 27
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> amplifying oligonucleotide

<400> 27
tatgaagatg caggtagtgc

20

<210> 28
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> amplifying oligonucleotide

<400> 28
atatgatcag ccagggttcg ccgt

24

B1
<210> 29
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 29
tatgagctca tgaactctgc cttgtgg

27

<210> 30
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 30
tatggatccg ggggtggcctc accg

24

<210> 31
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> octapeptide

<400> 31
Ala Glu Ala Phe Ala Glu Ala Trp
1 5